GAS JOURNAL, APRIL 5, 1944

VOL. 243 96th YEAR No. 4220

EDITORIAL NOTES

AN INSPIRING RECORD

IT would be quite out of place and even of time for us to dilate on the story of Malta's high gallantry; and we would not presume to offer through our columns comment in any general terms of that historic epic. Yet in this epic gas played a part, and we think that in the ordeal of fire the role it did play was appropriate to the Gas Industry's banner of service and deserves to be recorded in our pages. The story can be summed up in the one word duty—duty to the community. Bombs fell, of course, on works, on mains, on offices; they fell here, there and everywhere, causing structural havoc without, however, influencing moral. In spite of high explosives, many no doubt delivered at low altitude, gas supply continued, and no adverse circumstance deterred the responsible undertaking from carrying on and sustaining to the best of its ability the vital service of heat under appalling conditions. It was, in fact, only following the advice of the Government that the undertaking concerned—the Malta and Mediterranean—called a halt, a temporary halt, in its services. Nor was the hiatus prolonged. Reference to the story was made by the Chairman of the Company, Mr. A. M. Paddon, at the annual meeting, a report of which appeared in the "JOURNAL" last week. It is a splendid and inspiring record.

SULPHUR REMOVAL

ARGUING that the degree of purity from sulphuretted hydrogen in town gas required by statute is wholly illogical when one bears in mind that no limit is set to the other sulphur compounds, Mr. D. W. Davison, in a Paper to the Scottish Juniors, abstracted in later pages, suggested modification in the existing regulations coupled with a prescribed limit of 10 grains per 100 cu.ft. for total sulphur, which led to his plea for the introduction of liquid processes for H_2S removal, processes which he described and which formed the main theme of his contribution. The normal dry purification system works well and occasions little technical trouble; on the other hand, the ordinary rectangular box occupies a large amount of ground space, and the process entails the employment of a good deal of labour on what is not the pleasantest of jobs. It does, however, remove the H_2S completely, which is, we think, more than can be said for the liquid processes of the simple type. In this regard Mr. Davison suggested that, if the regulations remain unchanged, then the small amount of H_2S left in the gas after liquid purification could well be removed by oxide catch-boxes.

The subject was considered in brief quite recently by Mr. C. Cooper ("JOURNAL" of Feb. 2 last), and in view of Mr. Davison's strong advocacy of the employment of liquid processes it is interesting to recall the comments of Mr. Cooper, whose experience of the subject is extensive. The simplest method consists of scrubbing out the H_2S by an alkaline solution and then getting rid of the H_2S by exposing the solution to air or flue gas. Such a process would not be reasonably applicable in any ordinary urban area for obvious reasons. Devices have been tried to eliminate objections, but none of them would pass the test which we in this country would have to meet. We have a recognized method of gas purification which successfully does what it purports to do and creates a certain minimum of nuisance; alternative processes must not be more capable of such nuisance. Developments of this simple method have taken place designed to convert the H_2S to free sulphur, but their added complications have led to their comparative neglect. In general liquid processes present us with H_2S, and this has to be dealt with; and, to quote Mr. Cooper, "any liquid purification cycle must 'consume its own smoke' effectively, as well as have some merits in the direction of simplicity."

Not that the subject of liquid purification should be dismissed from consideration; on the contrary, it merits study and investigation, and in fact much thought has been given to the matter in this country. The cost of handling oxide has greatly increased, and this factor alone has revived interest in alternative methods. Concurrently it has also doubtless directed attention to the possibilities of greater mechanization of the work of handling and rehandling oxide; to employ three or four men on whole time with up-to-date mechanical handling, in place of large gangs at infrequent intervals, is obviously a desirable step. And maybe after the war tower purifiers will come in for renewed consideration where the factor of ground space looms large.

PREFABRICATION

"WE are not yet prepared to express any opinion on prefabrication except in so far as it is already advantageously applied in the building industry to many standardized units used in house construction. Proposals for new methods of construction, claiming to be particularly suitable for prefabrication, have been submitted to the committee. Among them none calls for special comment at this stage. We would note, however, that the term is too frequently applied to the manufacture of the entire house and its rapid and mechanical erection on the site, rather than to the application of factory methods in the mass production of certain component parts, thereby reducing site costs. The subject of prefabrication is being considered in principle by the Prefabrication Section of the Standards Committee of the Ministry of Works."

That is a passage from the Burt Report—a report of the Interdepartmental Committee on Housing Construction appointed by the Minister of Health, the Secretary for Scotland, and the Minister of Works, and presided over by Sir George Burt, published six days after the Prime Minister's broadcast announcement that "not only plans but active preparations on a nation-wide scale" were being made for "up to half a million" prefabricated houses. The report (H.M. Stationery Office, 2s.) is the first of a series of 22 post-war building studies now in preparation, and deals in broad outline with the alternative methods of house construction used in the inter-war years, the application of prefabrication and new methods of construction, and the carrying out or testing of forms of construction by field research or experiment. In this sense it has a wide, but not specific, interest for the Gas Industry, whose particular concerns with the post-war building problem will be dealt with in No. 6 of the series—"Gas Installations." There are, however, some sections of the report of special interest to us. On thermal insulation, for instance, there are some useful calculations on the relationship between the expense of reducing heat losses and the cost of fuel, and its bearing on national fuel economy, and it is pointed out that where alternative methods of construction are used there are many ways of securing high values of insulation. Especially is this the case when the loads are carried by a framework, as the panel fillings can be chosen with heat insulation as a primary requirement. Basic considerations affecting house construction are discussed, together with suggestions for the guidance of designers for a performance basis to ensure adequate strength and stability, thermal insulation, sound insulation, and the like. It is thought that this is the first time that such a basis for house construction has been formulated. It was necessary to do so, as, when constructions departing materially from traditional forms have to be considered, it is important to be clear on the essential technical requirements. The fact that designers after the last war had no such guidance was responsible for some of the difficulties

§§

then encountered with new constructions. In the interval much scientific work has been done and practical experience gained.

The further 21 reports are being prepared by committees for the most part appointed by a Government Department or convened by a professional institution, research association, or trade federation, so constituted as to ensure that the reports contain the considered views of experts and others closely concerned with the subject. Thus, "Gas Installations" are being dealt with by the committee convened by The Institution of Gas Engineers, solid fuel installations by a committee of the B.C.U.R.A., lighting by the Lighting Committee of the Building Research Board of the Department of Scientific and Industrial Research, business buildings by a committee of the R.I.B.A., and heating and ventilation by the Heating and Ventilation Committee of the Building Research Board of the D.S.I.R.

Personal

Mr. ROBERT W. FOOT, formerly General Manager of the Gas Light and Coke Company, who left that post in 1941 to join the B.B.C. and soon became Director-General and Chief Executive Officer of the Corporation, has been appointed Chairman of the Mining Association.

* * *

Mr. JOHN CORRIGAN, Engineer and Manager of the Brighouse Gas Department, has been appointed Engineer and Manager to the Loughborough Gas Department, and hopes to take up his duties in June.

* * *

Major W. R. BROWN, D.S.O., has been appointed a Director of the Power-Gas Corporation Ltd., and Mr. W. R. BESWICK (London Manager), Mr. R. W. RUTHERFORD (Technical Sales Manager), and Mr. CHARLES ROBSON (Secretary) have been appointed Directors of Ashmore, Benson, Pease & Co., Ltd.

* * *

At the annual meeting of the Wrexham Gas Company Mr. J. C. WILLIAMS, Secretary, was warmly congratulated on his completion of 50 years' service with the Company.

* * *

Mr. A. BROWN, Secretary and Joint Manager of the Cradley Heath Gas Company, has recently completed fifty years' service with the Company, having joined the staff on March 19, 1894. At the annual meeting of the Company, the Chairman, making a presentation to Mr. Brown, referred to this fact and expressed the Board's appreciation of his long and unstinted service. Later, a further presentation was made by the staff and employees of the Company as a mark of their esteem and affection.

Obituary

The death occurred on March 30 of Sir CHARLES VERNON BOYS, LL.D., F.R.S., a highly distinguished physicist who devoted some of his talents, which were unusual and had conspicuous brilliance, to the Gas Industry. The Boys Calorimeter is a present standard of precision gas measurement. It is interesting to recall that Professor Boys described this instrument to the Royal Society in 1905, and it was adopted as the standard instrument for testing London gas after the passing of the London Gas Act in 1906. When the Gas Regulation Act of 1920 introduced the method of charging for town gas according to its thermal value, he devoted himself to the construction of the Boys Recording Calorimeter—another British Standard. An early member of the Physical Society, from which he received the Duddell Medal in 1925, he served it successively as Secretary and President. He was elected a Fellow of the Royal Society in 1888, and was awarded a Royal medal in 1896, and the Rumford Medal in 1924, while he was awarded the Elliott Cresson Medal of the Franklin Institute of Philadelphia in 1939. He received a knighthood in 1935.

* * *

The death has occurred of Mr. FREDERICK JOHN GOULD. Following positions in Plymouth and Devizes, deceased was appointed to Thompson & Son, Calcutta, in 1898, but owing to illness returned home in 1900, when he joined James Milne & Son, being appointed London Manager in 1904. With Charles Bland he formed the Bland Light Syndicate in 1909, and the business continues under the title of "Bland Light" (Fredk. J. Gould). Mr. Gould joined the Society of British Gas Industries at its inception and was Chairman of the Council in 1926–27. He served as Hon. Secretary and Hon. Treasurer at various times and represented the Society on a number of Gas Industry Committees.

Dividend

Wrexham.—5½% on the ordinary stock and 5% on the redeemable preference stock for the year ended Dec. 31, 1943.

Letters to the Editor

Gas Industry Literature

DEAR SIR,—The consensus of opinion among gas engineers is that Mr. Tomlinson, in his article on "The Literature of the Gas Industry" ("GAS JOURNAL," March 1, 1944), has already done a great service to the Industry by bringing forward so pointedly and obviously so authoritatively a subject of the utmost importance which has been exercising our minds for several years. This is well evidenced by the interesting and useful discussion which has already taken place in your correspondence columns. It would be a great pity, however, if this awakened interest were allowed to go peacefully to rest in our wartime archives.

Here is a subject which gives our authorities—our Institution and/or our Gas Research Board—an opportunity to contribute an epoch-making service to the Gas Industry. It would even seem that this subject well merits the whole of the deliberations of a complete session or even a complete programme of an annual meeting of the Institution.

There is one point on which I would materially differ from Mr. Tomlinson's proposals. While agreeing wholeheartedly with his exposition of the positive necessity for the production of the standard work of reference accompanied by the series of specialized-handbooks, I would suggest that the dissociation of this work from the class-book or text-book for students is not altogether warranted or necessary.

As a result of many years' intimate experience of teaching Gas Engineering to budding gas engineers, I am convinced that there is an even more crying need for a good class-book for these students. For several years now the request of the student for guidance in acquiring text-books could only be answered by referring him to several books—excellent in their time, but now either out-of-print or woefully out-of-date (as may be seen by reference to the many-asterisked list supplied for guidance by the Institution, and to Mr. Tomlinson's "Gas Engineers' Book Shelf" in the "JOURNAL" Directory—at both of which the student and the teacher can only gaze wistfully and hopelessly).

And it is not sufficient for the satisfying of this sorely felt need to be "left to the teacher or lecturer." The standard of the Gas Engineering student nowadays is very high, and he is only very few years distant from taking technical control of an undertaking. He wants and deserves during his preparation for this objective the best and most authoritative literature and guidance available. Too frequently the teacher or lecturer is either too academic or too closely related to an individual firm of contractors or to an individual works (with obviously limited choice of types of installations) to ensure that his subject-matter and views will not be necessarily biased by his individual upbringing and immediate associations.

The standard class-book (or books) must not, therefore, be compiled by the teacher, but should be the authoritative standard work of reference; and my appeal is that this latter should be compiled with the student, the embryo gas engineer in mind, not only for its subject-matter, but obviously also in the matter of handiness and price.

The financial aspect naturally in consequence merits serious consideration, but there is not a shadow of doubt that money spent by the Institution or by the Gas Industry as a whole in financing such a project could not be spent in a worthier cause.

Manchester,
March 25, 1944.

Yours faithfully,
M. BARASH.

DEAR SIR,—It is obvious that before all the books discussed by Mr. T. A. Tomlinson in his article on "The Literature of the Gas Industry" can be published a considerable time must elapse. The time factor is important, and the question of the priority to be assigned to the different publications naturally arises.

Mr. Tomlinson rightly places first on his list a book containing carefully selected data relating to the manufacture of gas and to gas distribution and utilization. In England *Technical Data on Fuel* has set the standard for a publication of this nature, and in Germany the Wärmestelle has set a high standard in such publications as *Anhaltszahlen für den Energieverbrauch in Eisenhüttenwerken.* *Technical Data on Fuel* is attractive for its companionable size and moderate price. The right Committee ought to be able to arrange for the early publication of a like volume for the Gas Industry, since what is required here is judicious selection rather than comprehensive treatment. Books with some claim to the latter are in general too bulky as desk companions. Moreover the smaller book is more rapidly brought up to date in subsequent issues, and a moderate price would bring it within the reach of junior technical personnel.

The publication of abstracts of appropriate scientific and technical papers and of patents is essential, but it is to be hoped that before an abstracting service is established the question of collaboration with existing abstracting bodies will be examined. Already there is considerable overlap in this direction.

Mr. Tomlinson does not appear to consider that official action is necessary to provide the student with good text-books, but suggests that if authoritative books of a comprehensive nature are forthcoming, lecturers will compile some notes at least from these sources, and that the writing of the class-book can be left to the lecturer. The writing of books of this character is an onerous and commonly unprofitable business, and some encouragement and stimulus should be given by the Gas Industry.

The requirements of students should receive every consideration, for the syllabuses of the Gas Engineering Courses are wide, and many lecturers must find difficult the covering of the whole of the ground which is specified. The Fuel Efficiency Committee of the Ministry of Fuel and Power has published a good series of lecture notes on matters relating to the economical raising of steam, and the Gas Industry might consider taking similar action, so that the part-time student in particular, in Gas Engineering, should have readily available reliable information to supplement the lecture notes which he alone has compiled. The lecturer would thus be free to devote time to emphasizing the more important aspects of his subject, to describing modern developments and procedure, and to indicating the trends of present research work.

College of Technology, Yours faithfully,
Manchester 1. A. McCULLOCH.
March 28, 1944.

Coal Conservation

DEAR SIR,—You have been good enough to refer in your columns to my recent Address to the Fuel Luncheon Club, and I should be grateful for an opportunity of answering questions as to the derivation of the figure of 64% for the efficiency of gas manufacture. I adopted this figure after consultation with leading authorities with better knowledge of the Gas Industry than myself. I have since examined the Board of Trade Returns to see how they fit. The following calculations may therefore be of interest:

TABLE I.—EFFICIENCY OF GAS MANUFACTURE.

Based on 1937 Board of Trade Statistics and Data for Calorific Values of Coal and Coke.

	Quantity.	Calorific Value.	Therms × 10^6.
Input:			
Coal	18,650,000 tons	308 therms/ton	5,744
Gross Output:			
Gas sold	316.4 × 10^9 cu.ft.	472 B.Th.U./cu.ft.	1,493
Coke sold ...	8,180,000 tons	257 therms/ton	2,101
Tar sold	236.8 × 10^6 gall.	1.5 therms/gall.	355
			3,949
Less material brought in:			
Coke oven gas 28.03 × 10^3 cu.ft. at 520			146
Oil for carburetting 32.89 × 10^6 gall. at 1.7			56
		Net output ...	3,747

Thermal Efficiency = $\frac{\text{Net output}}{\text{Net input}}$ = 65%.

TABLE II.—CALORIFIC VALUE OF GAS COAL AND COKE.

Coal:	
Average of 13 samples of Durham gas coal (Industrial Survey) 14,000 B.Th.U./lb.	313.6 therms.
Average of 12 samples of Yorkshire and Derbyshire commercial grades of gas coal (from Coal Survey Reports) 13,480 B.Th.U./lb.	301.8 ,,
Mean value ...	308 therms/ton.
Coke:	
Average of 9 London, Provincial and Scottish gas cokes 11,500 B.Th.U./lb.	257 therms/ton.

The figure of 65% is very close to that which I quoted, and the agreement would be even better if, as I believe, the average calorific value of coke sold throughout the country in 1937 was below 11,500 B.Th.U. per lb. The difficulty of making an estimate turns on the uncertainty with regard to the moisture content of coke, which I have more than once heard described as excessive at meetings of The Institution of Gas Engineers.

The breakdown of the 64% into 4% tar, 40% coke and 20% gas was based on the commonly adopted ratio of two parts coke to one part gas. From the Board of Trade figures it appears the tar should read 7%, coke 34% and gas 23%, which brings the "gas production efficiency" to 46% as against the 40% which I quoted.

As against this it has been pointed out that I adopted too high a figure for present-day gas fire efficiency, which stands at 45% rather than 50%. If these two corrections are made the final result remains unaltered—namely that existing gas fires, electric heaters, and coal fires all are within one or two points of a working efficiency of 16% based on the heat value of the original coal.

The broad conclusions which I endeavoured to draw seem to be well founded. These are:

1. Coal conservation is not furthered by the use of gas or electricity for room heating rather than raw coal.
2. Progress in appliance efficiency is likely to strengthen the position of coal as compared with gas and electricity, simply because there is more room for improvement.
3. The case for the choice of gas and electricity mainly turns on their superior convenience in use.

May I conclude by endorsing Lord Brabazon's warning at the recent E.D.A. meeting, that domestic consumers will not stand for any dragooning as to the way in which they will heat their houses or do their cooking. There must be freedom of choice for the householder and freedom of technical development for the three industries.

British Coal Utilization Research Association, Yours faithfully,
Rickett Street, West Brompton, J. G. BENNETT,
London, S.W. 6. Director.
March 21, 1944.

DEAR SIR,—While agreeing with Mr. John Roberts as to the fundamental errors in the recent speech of Mr. J. G. Bennett to the Fuel Luncheon Club, Mr. Roberts himself makes a mistake in stating that tar has a calorific value of over 18,000 B.Th.U. per lb. According to *Technical Data on Fuel,* the calorific value of tar is given as 16,740 gross or 16,155 net B.Th.U. per lb.

Scottish Tar Distillers, Ltd., Yours faithfully,
Falkirk. ARTHUR GROUNDS.
March 30, 1944.

1944 "Journal" Directory

Page 14. BURY ST. EDMUNDS. R. T. Thomas, *E. & M., vice* H. R. Wimhurst.
,, 22. DORCHESTER. H. A. Cole (Crewkerne), *E. & M., vice* F. Osmund.
,, 24. DURSLEY. T. L. Tallentire, *E. & G.M.*
,, 70. TOTTENHAM. R. H. Epps, *S., vice* E. J. K. Fussell.
,, 72. WALSALL. S. Brockbank, *Actg. E. & M., vice* F. Davies, resigned.

Diary

April 8.—Scottish Junior Gas Association: Granton Gas-Works, Edinburgh.
April 13.—Midland Junior Gas Association: Annual General Meeting, Chamber of Commerce Buildings, Birmingham, 4.15 p.m. Presidential Address of Mr. F. J. Bengough.
April 14.—Manchester District Association of Gas Engineers: Annual Meeting, Midland Hotel, Manchester, 2.30 p.m.
April 14.—Institution of Chemical Engineers: Annual Meeting, Connaught Rooms, W.C. 2, 11 a.m. Presidential Address of F. A. Greene; Luncheon 1 p.m.; J. Arthur Reavell Lecture by J. G. Bennett on "Coal and the Chemical Industry," 3 p.m.
April 14.—North British Association of Gas Managers: Spring Meeting, Glasgow, 10.15 a.m. Presidential Address of Mr. R. Fife.
April 14.—B.C.G.A.: Domestic Heat Services Committee, Gas Industry House, 2.30 p.m.
April 17.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m.; Gas Industry House.
April 18.—British Gas Federation: Special General Meeting, Gas Industry House, 3.30 p.m.
April 18.—Central Executive Board of the National Council: Gas Industry House, 2 p.m.
April 19.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.
April 19.—Midland Association of Gas Engineers and Managers: Meeting at Birmingham University, 10.15 a.m.
April 20.—Institute of Fuel: Institution of Mechanical Engineers, 2.30 p.m. Paper by Dr. A. Parker on "The Organization of a Research Department."
April 26.—Association of Gas Corporations: Finance Committee, 2 p.m.; General Purposes Committee, 2.30 p.m.; Council, 3.30 p.m.; Annual General Meeting, 4 p.m., Gas Industry House.
May 3.—Southern Association of Gas Engineers and Managers (Eastern District): Gas Industry House, 2.30 p.m. Paper by C. B. Frisby on "Industrial Psychology in Practice."
May 4.—North of England Gas Managers' Association: Annual Meeting, County Hotel, Newcastle, 2.15 p.m. Presidential Address by Mr. J. W. Pallister.
May 17.—Midlands District Gas Salesmen's Circle: "Coming-of-Age" Meeting, Imperial Hotel, Birmingham, 2.30 p.m. Address by Mr. R. J. Rogers.
May 18.—Wales and Monmouthshire Association of Gas Engineers and Managers: Meeting at Pontypridd.
June 13–14.—Institution of Gas Engineers: Annual Meeting, Edinburgh.
July 7.—Manchester District Association of Gas Engineers: President's Day, Mirfield.

Gas and Electricity Reductions

An immediate national cut in supplies of electricity and gas for industrial purposes has been ordered by the Ministry of Fuel and Power. Electricity will be cut by 10% and gas by 25%. Domestic supplies are not being cut.

The war situation and the fall in coal production have necessitated these special steps. The recent strikes in the coal industry have aggravated the situation. Instructions were issued last December which imposed a 10% reduction in the programme of coal deliveries to all industrial undertakings.

It was announced last Saturday that tramcar and trolleybus services outside the rush periods are to be cut by 20% in the north-west region to conserve coal supplies.

B.C.G.A. North-Western District

Following a luncheon at the Midland Hotel, the Annual Meeting of the North-Western District of the B.C.G.A. was held in the demonstration theatre of the Manchester Gas Department on March 24.

Mr. C. H. Leach, General Manager and Secretary of the Liverpool Gas Company, proposing the re-election of Col. Carr as Chairman of the District, paid a tribute to the work of the Colonel for the District and the Gas Industry in general.

Col. Carr, in thanking the meeting for their vote of confidence, said that he regarded the Management Committee of the B.C.G.A. as the most important Committee of the District, as it was in the field of development that the future of the Industry lay.

Mr. Stanley Hopkinson, Public Relations Officer to the Liverpool Gas Company, was re-elected Hon. Secretary of the District, and appointed unanimously to represent the District on the Executive Committee of the Association.

Mr. F. A. West, of Altrincham, was elected Deputy-Chairman in place of Mr. J. D. Ashworth (Blackburn), who had resigned through pressure of business.

A resolution was moved by the Chairman to the effect that the title of the area administered by that meeting should in future be the North-Western Region of the British Commercial Gas Association. Col. Carr said that his reason for putting the proposition was to bring the area in line with Governmental practice. The term "Region" was now commonly used to denote the area supplied with gas by the members present in all matters relating to Civil Defence and planning.

The Chairman's proposition was adopted, and the three areas of Merseyside, Manchester, and Ribble will in future be known as Sub-regions.

Further business included a report on the work of the Domestic Heat Services Committee by the Secretary, Mrs. Eileen Murphy, and explanation of the housing models in the Manchester Gas Department (later inspected by the members) by Mr. John Hughes, B.Arch., F.R.I.B.A., Manchester Director of Housing, and the adoption of a Report from the Management Committee on the work of the District during the past year.

The Management Committee was declared elected as follows:

Elected by the Manchester Region (6):
- Col. W. Moncrieff Carr, O.B.E., T.D., United Kingdom Gas Corporation.
- J. H. Cadman, F.C.I.S., Manchester.
- F. Greenhalgh, Oldham.
- T. Reynolds, Stockport.
- H. D. Robinson, Middleton (Regional Sec.).
- F. A. West, Altrincham (Regional Chairman).

Elected by the Merseyside and North Wales Region (5):
- H. Blythe, Colwyn Bay.
- H. Hopkinson, Chester.
- S. Hopkinson, Liverpool (Regional Secretary).
- C. H. Leach, M.A., A.C.A., Liverpool (Regional Chairman).
- J. H. Richmond, Runcorn and Northwich.

Elected by the Ribble Region (3):
- T. W. Barratt, Assoc.M.Inst.C.E., Morecambe and Heysham.
- A. H. Nicholson, Colne (Regional Secretary).
- J. H. Ranft, Lytham St. Annes (Regional Chairman).

S. H. Packer (Manchester) represents the Gas Salesman's Circle.

Institution of Heating and Ventilating Engineers

Members of the Gas Industry are invited to attend the undermentioned Sessional Meetings of the Institution of Heating and Ventilating Engineers and to take part in the discussions, if they so desire. All the meetings will be held in the Lecture Hall at the Institution of Mechanical Engineers, Storey's Gate, S.W. 1, commencing at 6 p.m.

April 26.—"Zonal Heat Distribution as a Step towards District Heating," by J. L. Musgrave, M.Inst.C.E. (Past-President).

May 24.—"Trends in the Development of Heating and Ventilating Installations," by Professor Sir Alfred Egerton, F.R.S.

June 21.—"Vertical Temperature Gradients in Factory Buildings Heated by Unit Heaters." Technical data to be submitted by members of the Birmingham and District Branch, who will open the discussion.

July 19.—"Heating, Past, Present and Future," by J. R. Kell, A.M.I.Mech.E. (Member).

Sept. 6.—"Unit Heaters," by G. L. Copping, A.M.I.Mech.E. (Member).

At the Annual Meeting of the Wrexham Gas Company the Chairman, Mr. J. Bagnall Bury, alluded to the great loss which the Company had sustained through the death of Mr. E. Llewelyn Rogers, who had rendered most valuable and devoted services as Deputy-Chairman and as a Director for many years. He mentioned that the vacancy on the Board of Directors had been filled by the appointment of Mr. F. W. Stevens, and that Mr. T. Lloyd Williams had been appointed as Deputy-Chairman. The Engineer and Manager, Secretary, and all employees were warmly thanked for their valuable services, and the Secretary (Mr. J. C. Williams) was warmly congratulated on his completion of 50 years' loyal and devoted service with the Company.

Coal and Coke Supplies

The Minister of Fuel and Power has given a direction restricting supplies of house and kitchen coal and Coalite during April to the same maximum as for March—viz., 4 cwt. in the South of England and 5 cwt. in the North, but the limit to which stocks can be raised is now 5 cwt. over the whole of the South, 7 cwt. in the N. Midland and N. Eastern regions, and 10 cwt. elsewhere. During March the 5 cwt. stock limit applied only in the London and Eastern regions.

The maximum total supply for the group consisting of coke, small anthracite, and Welsh dry steam coal, and all manufactured fuels other than Coalite is reduced to 5 cwt. with a 10 cwt. stock limit for the South of England. In the North, the maximum of 10 cwt., with a stock limit of one ton, remains unaltered.

Gas Engineering Advisory Boards

The Co-ordinating Committee of the Gas Engineering Advisory Boards has received with regret the resignation of its Chairman, Dr. E. V. Evans, owing to his increased responsibilities in other directions. Dr. Evans was largely instrumental in bringing into being the Gas Engineering Advisory Boards in the various Regions, and had been Chairman of the Co-ordinating Committee since its inception in 1942. The Committee has unanimously elected Mr. S. E. Whitehead (Southampton), Vice-President of The Institution of Gas Engineers, to be its new Chairman, and Mr. C. F. W. Rendle (Redditch) to be Vice-Chairman.

The Co-ordinating Committee consists of the Chairman and Secretary of each Board, together with the members of the General Purposes Committee of the Council of the Institution. It meets quarterly to receive and discuss progress reports of the Chairmen of the Boards, and to consider difficulties and questions of policy arising out of their work. Meetings are attended, by invitation, by the Director of the Gas and Electricity Division of the Ministry of Fuel and Power (Mr. R. Kelf-Cohen) and other members of the Division.

The Spring Meeting of the North British Association of Gas Managers will be held on Friday, April 14, in the Grosvenor Restaurant, Glasgow. The Chair will be taken at 10.15 a.m., and, after formal business has been transacted, the President, Mr. R. Fife, will deliver an Address.

Industrial Bulletin No. 3, issued by the Ministry of Fuel and Power, deals with the economical lubrication of steam turbines and reciprocating steam engines. Observance of the principles outlined will not only provide for the reliable lubrication of the engine but, by maintaining the condition of the oil, greatly prolong its life in service.

No fewer than 63 members of the Birmingham and Five Counties Architectural Association visited Radiation Ltd. to inspect the full-scale kitchen at Radiation House, Birmingham. In these busy days it is a great compliment to the Gas Industry that so many members should spare the time and take such interest in the application of gas for cooking, refrigerating, water heating, and laundry purposes as exemplified in the kitchen which Radiation Ltd. are displaying.

The Housing Committee of the Dundee Town Council recently had under consideration the different methods of providing hot-water facilities in 48 houses in course of erection. A report submitted by the Gas Engineer and Manager recommended the fitting in the living-room fireplaces of grates primarily designed to burn coke and to work in conjunction with a back-boiler. As auxiliary to the back-boiler and to provide the hot-water supply during periods when the living-room fire was not in use, the installation of gas-operated circulators was recommended. The fitting of coke grates in a number of the houses and of gas-operated circulators in others has been approved. The suitability and running costs of the various fuels will be ascertained, and will assist in framing future policy in the field of domestic water heating.

At Their Meeting on March 21, the Council of the British Iron and Steel Federation approved a scheme whch had been prepared by a Committee set up by Sir James Lithgow, Bt., M.C. (the outgoing President, who was Chairman of the Committee in question), for the formation of the British Iron and Steel Research Association, which will take over the work of the Iron and Steel Industrial Research Council. The Constitution of the new Research Association provides for collaboration with the Iron and Steel Institute, with the right of nomination of members of the Council of the new Association. The scheme adopted provides for an annual expenditure of any amount which the Council of the Research Association may find necessary for the work required; and authority has been given to the Association to expend in the first instance up to £250,000 annually without further reference for the approval of the Federation. In the meantime, the Iron and Steel Industrial Research Council is continuing to direct the large range of research which it has in progress.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

H_2S Removal by Liquid Processes*

By DOUGLAS W. DAVISON, B.Sc., Inverness

THE Gas Regulation Act of 1920 specifies that absorbent papers dipped in a 6.5% solution of lead acetate and subsequently dried shall be exposed to town gas in the special apparatus for a period of three minutes. If no visible staining of the papers occurs, then sulphuretted hydrogen shall be taken as absent. The extreme sensitivity of this test is not generally realized; in fact this test will detect 1½ parts of H_2S by volume per million parts of coal gas. This is equivalent to rather less than 0.1 grain of H_2S per 100 cu.ft. of gas. What, then, are the reasons for the insistence of the powers-that-be on such a degree of removal? If we examine the toxicity of H_2S, we find that 0.007% by volume of H_2S in air has been known to be fatal after one hour's exposure as compared with 0.15 to 0.20% of CO in air to produce the same physiological effects(1)—*i.e.*, as we know, H_2S is extremely toxic and is approximately 20 times as toxic as CO. However, its concentration even in crude coal gas is under 1% by volume, whereas the concentration of CO is probably 15–20%, or even higher. We see, therefore, that from the point of view of toxicity, the necessity of purifying down to such a low concentration is uncalled for. The fact that H_2S has a very unpleasant smell may be more of an advantage than otherwise, in that it may lead to the detection of small leaks.

Considering the corrosive effects of the gas, it has been stated and found experimentally that at atmospheric pressure the corrosion "threshold"—*i.e.*, the concentration at which rapid corrosion is initiated—is approximately 16 grains per 100 cu.ft.(2).

From the point of view of products of combustion one admits, of course, that SO_2 is formed and is deleterious to fittings of all kinds, but this gas is also formed on the combustion of CS_2, in fact, one volume of CS_2 will yield twice the volume of SO_2 obtained by the combustion of one volume of H_2S.

It is therefore seen that the degree of purity from H_2S required by statute is wholly illogical when one bears in mind that no limit is set to the other sulphur compounds; indeed, I am at a loss to understand why the Industry, when the Act was being framed, did not strongly denounce this test.

In the U.S.A. there are a number of different State regulations regarding H_2S purity, a common test being the exposure of papers dipped in a 5% lead acetate solution to the gas for a period of one minute, the gas rate being 5 cu.ft. per hour. This test is therefore fully three times less stringent than that applied in this country, and it has been found that it will detect as low a concentration as 0.3 to 0.4 grains of H_2S per 100 cu.ft. of gas(3). In Germany the State regulations are similar to those applied in the U.S.A.

I suggest, therefore, that the existing Regulations in this country be modified to the use of a 4% lead acetate solution for a period of one minute, which test would detect 0.5 grains of H_2S per 100 cu.ft., and, coupled with it, there should be a prescribed limit of 10 grains per 100 cu.ft. for total sulphur. This regulation to be put into force as soon as conditions return to something like normal, and in accordance with the views of the I.G.E. Committee of Enquiry on Sulphur Removal, all undertakings be encouraged to distribute a "3 grain gas"(4). It might be necessary to modify the 3 grain limit depending on the class of coal carbonized, but even with high sulphur English coals, Hollings, Hutchison, & Griffith have shown that there are several practical methods of reducing the total organic sulphur to this desirable low limit(5). The benefits of low sulphur content have been enumerated frequently, and it is obvious that if the Gas Industry is going to tap the vast flueless heater field, this problem will have to be tackled energetically in the near future. The U.S. have forestalled us in the question of limitation of organic sulphur, many States having a statutory limit of 30 grains(6)—an altogether too high limit.

An advantage which would accrue from the relaxation of the H_2S regulations would be that the door would be open for the introduction of liquid processes for H_2S removal, because it is found that, while it is feasible to reduce the H_2S to the present figure, it is more economical to purify to a slightly less extent. Presuming, however, that the regulations are kept as at present, one could remove, say, 90% of the H_2S by a liquid process and the balance by oxide of iron catch-boxes, the charges of which would last a very long time.

Considering, now, the processes available for H_2S removal, the first and universally employed is the use of hydrated oxide of iron either "artificial" or in the natural state, contained in the standard type of square or rectangular box. There can be no argument against this process on the score of efficiency, as it can be relied upon to do its job year in, year out, with very little supervision. The unpleasant smell and disagreeable working conditions associated with the present method prompted me to investigate alternative processes, and details of these I wish to put before you. Another disadvantage of the present method is the very great ground space it occupies, and in these days many works are becoming rather limited for ground space owing to growing outputs, and the fact that the works are situated in largely built-up areas; this factor is, therefore, in many cases of vital and urgent import.

Wet processes for sulphur removal involve the scrubbing or suitable treatment of the gas with a suitable solvent, and these processes fall into three categories—*viz.*, (1) those which result in the production of elemental sulphur only; (2) those which give elemental sulphur and salts, such as ammonium sulphate; and (3) those which absorb the H_2S under certain conditions of temperature and pressure to release it again when the conditions are altered. In each case there is a large number of processes available, some of which have been highly successful in the large scale, others which have never got beyond the laboratory.

It is the first category—namely, that which results in the production of elemental sulphur only—that seems to hold most hopes, and into which the majority of the successful large-scale installations fall. The best known process in this group is probably that of Koppers, namely, the "Thylox" process. Briefly the solvent is a dilute alkaline solution of arsenic trioxide, sodium carbonate or ammonium hydroxide being the alkali employed. The wash liquor after taking up H_2S is regenerated with air.

The sulphur is filtered from the froth which is formed and may be melted down to crude sulphur in an autoclave.

This process has been widely used outside this country; indeed, up to the commencement of this war there were 21 Thylox plants in existence; of these 10 were in U.S.A., 6 in Europe, and 5 in Japan, and the capacities total 350 million cu.ft. of gas per day. It can be seen therefore that this process is by no means in its infancy, and has now had a chance to outgrow the teething troubles so often associated with new processes. For this reason I propose dealing with this process in rather greater detail.

The first Thylox plant on a large scale was built in 1926 in the U.S.A., and in the following three years, thanks to the excellent technical results obtained with this plant and to the low operating costs, four more plants were erected. Further plants were erected subsequent to 1930 in Germany and Japan. It is a significant feature in favour of the economic working of the Thylox plants that both U.S.A. and Japan have natural sulphur deposits.

In the large-scale plant, the gas to be freed from H_2S passes up the gas washer in counter-current to the Thylox solution, which, as stated before, is ammonium thioarsenate. The reaction taking place in the washer is basically the absorption of a sulphur atom forming a higher arsenate and water. Some 98% of the H_2S in the gas is absorbed, and at the same time most of the cyanides are extracted and converted into thiocyanates. The washing solution is kept slightly alkaline with ammonia, and since a little of this ammonia is left in the gas, it is recovered in a washer placed after the Thylox washer.

The solution is then heated to about 45°C., at which temperature the succeeding regeneration of the solution takes place rapidly. The warm solution is then caused to flow up a high tower accompanied by a stream of air in parallel. This results in the liberation of sulphur, and the formation of the original ammonium thioarsenate.

It can be seen therefore that the process is fundamentally the same as the oxide of iron one, and does not involve any complex reaction.

The regenerated solution is used again for the washing of the gas. The upward current of air in the tower carries the sulphur with it in the form of a froth to the top of the tower, where it forms a yellow scum, which is collected in a sulphur separator. The sulphur is then dewatered in a centrifuge to give a product containing about 30–40% of water. This is melted in an autoclave to separate the aqueous solution, and after distillation is suitable for many purposes, although it contains a small proportion of arsenic. Imperial Chemical Industries have developed a process which consists of washing the molten sulphur with ammonia solution under pressure, which gives a product almost completely free of the arsenical impurity.

As has been stated above, the process does not result in the complete removal of H_2S, but this has been achieved in the U.S.A. by using a two-stage process.

The single stage process alone would be quite satisfactory for British practice, for if a relaxation of the present Regulations was not permitted, the final traces of H_2S could readily be removed by oxide of iron catch-boxes. These boxes would only need attention at very infrequent intervals, since the gas entering would contain no tar, no cyanides, and very little H_2S.

As an example of what the single stage process without catch-boxes can do, the figures taken from a Japanese plant working on coke-oven gas are interesting:

H_2S content before purification,	410	grains	per 100 cu.ft.
" of purified gas .	0.06	"	"
Degree of extraction .	99.99%	"	"

Bearing in mind the aforementioned sensitivity of the Referees' lead acetate test, it is seen that this gas would satisfy even the most exacting gas examiner.

Turning to the economics of the Thylox process, one cannot, of course, quote present-day figures owing to fluctuations in international currency, and to the fact that many of the plants are in enemy territory. However, if we take an installation purifying 15 million cu.ft. of coal gas per day, having an H_2S content of 450 grains per 100 cu.ft., the operating costs (pre-war) were 0.07d. per 1,000 cu.ft.=approximately 0·014d. per therm. It is considered that, in spite of the fact that these

* From a Paper to the Scottish Junior Gas Association (Eastern District).

figures were obtained under German conditions and involved the recalculation into British currency, they would substantially have been obtained in this country prior to this war. There is a lower limit to the amount of gas which can be purified by the Thylox process if it is to replace the oxide process on purely economic grounds. On the other hand, the greater the volume and the higher the H_2S content, the less will be the working costs per unit of gas purified, until, with a very large plant and gas of high H_2S content, it is possible to obtain a credit balance from H_2S removal.

Another important wet method is the "Ferrox," which utilizes a suspension of ferric hydroxide in an alkali. This then is making use of the reaction with which we are all familiar. The greater development of this process has been retarded on account of the contamination of the regenerated sulphur with solid iron hydroxide. The uses to which the product can be put are therefore limited, but it is perfectly suitable for burning for the production of sulphuric acid.

The second of the three groups of processes is that which yields elemental sulphur and salts, such as ammonium sulphate. There are several variations in the method of carrying this out—all German in origin. The most interesting and the most successful is known as the "Katasulf" process, and it has been worked most satisfactorily on the large scale at Huls in Germany. The main reactions are the oxidation of H_2S to SO_2, which combines with the ammonia present to form ammonium sulphate. This is then converted to ammonium sulphate and elemental sulphur by the addition of sulphuric acid. It is seen therefore that the plant must be placed in the purification train before the last traces of ammonia have been removed. Indeed, the ratio of sulphur to ammonia is rather critical, the plant working best when this ratio is 1 : 1–2. The plant at Huls treated gas containing 450 grains of H_2S per 100 cu.ft., reducing it to 0.5 to 1.0 grains, so that its efficiency cannot be questioned. Financial details of this plant are scanty, but it would seem to offer distinct possibilities that NH_3 removal is simultaneous with H_2S, and having the added advantage of direct ammonium sulphate manufacture—a coke-oven process which the Gas Industry has been loath to adopt.

Finally, we have the third group of processes—namely, the absorption of H_2S by certain solutions under specified conditions of temperature and pressure, and its subsequent release when the conditions are altered. Experiments along these lines were carried out in the 90's of last century, but it was not until the Seaboard process was developed by Koppers in U.S.A. in 1921 that it reached the large scale. The Seaboard method consists of scrubbing the gas with a 1–3% solution of soda ash, which removed about 90% of the H_2S and some of the CO_2 and HCN. This reaction is reversed by blowing air through the resultant mixture, causing the H_2S to be liberated. In the United States this H_2S was blown to waste, causing, of course, atmospheric pollution. This is quite unnecessary, as the H_2S can be burned for the production of acid or converted to elemental sulphur. Koppers, however, abandoned this process in favour of their "Ferrox" one. An interesting development of the Seaboard process was put to work in the large scale in 1939 in the German town of Minster Stein. This consisted of the washing of the gas with a solution of potassium carbonate under a pressure of 120 lb./sq. in. The reaction was reversed under reduced pressure, and not only were the H_2S and HCN completely removed, but 40% of the organic sulphur was washed out. This process might well be considered in this country if high-pressure long-distance transmission of purified gas was coupled with centralized gas production at collieries—an entirely logical development which has been envisaged by not a few. Koppers, who erected this plant at Minster Stein, claim that the process is an economical one, as the sale of the sulphur covered the working costs.

The last process I will deal with is the "Alkazid," which makes use of the fact that H_2S is a stronger acid than phenol at normal temperatures, but when the temperature is raised the acidity of the phenol increases and H_2S is evolved. We have, therefore, a straightforward reaction, the phenol being in the form of sodium phenolate, with which the H_2S reacts to form sodium hydrosulphide and phenol. When the temperature is raised the reaction is reversed. CO_2 present in the gas is simultaneously removed. This process is widely used in the U.S., and plants capable of recovering 25,000 tons of sulphur per annum either as H_2SO_4 or elemental sulphur have been laid down.

I hope I have indicated by the few processes I have described that the removal of H_2S by liquid means is a perfectly feasible proposition, and I suggest it is a subject which could well come within the vista of the Gas Research Board. By their examination, and, if necessary, trial of the available processes, they could give the Industry a pointer to the most useful and economic process to adopt when the time is ripe for such a change.

The development of these processes by the Germans, it should be noted, was largely brought about by their striving after self-sufficiency in the synthetic fuel field, this being a necessary state in view of their war aims. It may well be that their efforts may be used to our advantage to make this country independent of foreign sources of sulphur.

References

(1) Lunge and Ambler.—*Technical Gas Analysis.*
(2) "Fuel Flue Gases," *American Gas Association*, 1940, p. 98.
(3) McMride and Edwards.—U.S.Bureau of Standards.
(4) "Report of the Committee of Enquiry on Sulphur Removal," *Institution of Gas Engineers Comm.* No. 250, 1942.
(5) Hollings, Hutcheon and Griffith.—"Removal of Sulphur Compounds from Gas," *ibid.*, No. 175/64, 1937.
(6) Private communication from Director of Gas Research Board, 1943.

DISCUSSION

The **President** (Mr. T. B. Livingstone, Perth) could not support the Author's plea for a relaxation of the provisions of the Gas Regulation Act in so far as H_2S removal was concerned, as he felt that the ultimate aim of the Industry should be complete sulphur removal. Liquid purification offered a very attractive method of H_2S removal, but it appeared that a number of considerations had precluded its adoption in this country. Mr. Davison had quoted a figure of 0.08 grain per 100 cu.ft. as having been obtained with a Thylox plant in Japan, and said this would satisfy British requirements. Hollings and Hutchison had given the detectable minimum as 0.05 grain per 100 cu.ft. The question of catch-boxes would require careful attention, as it was generally held that gas with low H_2S concentration was difficult to purify and difficulty would probably be experienced in keeping the catch-boxes active.

Mr. **W. M. Gledhill** (Stirling) wondered whether the effluent from the Thylox process would be objectionable as far as disposal was concerned. He was not sure that the Industry would be wise in substituting a mechanical process involving constant supervision for one which was non-mechanical.

Mr. **A. W. Brown** (Alloa) suggested that the only objection to oxide purification was the fact that boxes had to be emptied and filled. They in Alloa had worked oxide up to 50% sulphur in one fouling, and over the last two years had actually made a profit on H_2S purification, though he admitted this was too short a period to be taken as representative.

Mr. **W. Masterton** (Edinburgh) agreed with Mr. Davison that legislation regarding sulphur content of the gas was too exacting and yet not exacting enough, too exacting regarding sulphur present as H_2S, and too lax as regards total sulphur. It was desirable from the point of view of good gas service to have the total sulphur as low as possible; the distribution of the sulphur among its various forms was of little interest. Whether they accepted or rejected the idea of liquid purification in place of oxide purification, they must admit that the present somewhat unscientific requirements respecting H_2S removal favoured the latter. If he were tackling the question of H_2S removal he would rather endeavour to find methods, as mechanical as possible, of working the present process. He wondered whether it was possible for some small proportion of the arsenic to depart from the normal reaction, and result in the presence of arsenic in the gas in even minute traces; if so, he thought it was a liability of the process, for some substances had extraordinary effects on certain people even in the smallest traces. He cited mercury as an example. He would like to know how the oxidation of H_2S to SO_2 was accomplished in the "Katasulf" process.

Mr. **W. Scott** (Hamilton) thought that the Thylox process was worth investigating, as purchasers required a purer form of sulphur than that being supplied at present.

Mr. **D. N. Garrie** (Tayport) was disappointed that the Author had not carried out some experimental work on the subject, and thought that had liquid purification been a success it would have been tried before now in this country. He suggested they should try to find a process which would be simple and not have too many complications for the small works.

Mr. **Davison,** in reply, said the most efficient plant for the removal of total sulphur was capable of reducing it to about 1 grain per 100 cu.ft. and, as the proposed alteration in the H_2S regulation would detect 0.5 grain per 100 cu.ft. (requiring purified gas to contain 0.1–0.2 grain to give a reasonable factor of safety), he suggested that Mr. Livingstone was looking rather far ahead in condemning this relaxation. The figure of 0.08 grain per 100 cu.ft. as the detectable minimum in the referees' test was obtained from an authority on the subject. He agreed with Mr. Livingstone that low H_2S content at the inlet to catch-boxes might be troublesome, but suggested that as no tar and no cyanides were present, this might increase the activity. As far as he was aware no trouble in the existing plants had been experienced, though they, of course, were not required to purify down to the low concentration required in this country. In reply to Mr. Gledhill he stated that the volume of effluent was negligible; indeed the Thylox solution actually required dilution with fresh solution from time to time. In order to maintain the volume of liquid in the circuit constant, some of the concentrated solution was withdrawn. After treatment, the arsenic in it was returned to the washing process, and the residue run to waste, it being quite satisfactory from the point of view of disposal. While agreeing with Mr. Gledhill that by adopting wet purification they would be substituting some mechanical equipment for a non-mechanical process, he did not subscribe to the view that this was necessarily a retrograde step; if this attitude had been adopted for other processes they would not have progressed very far. Mr. Davison complimented Mr. Brown on his results with oxide purifiers, and hazarded the opinion the electrostatic tar precipitation had not a little to do with this. While he could give no definite assurance to Mr. Masterton on the absence of minute traces of arsenic in gas purified by the Thylox method, he assumed that final ammonia washing (after Thylox washer) would eliminate this; in any case that would require investigation if and when the process was investigated by a body such as the Gas Research Board. The oxidation of the H_2S to SO_2 in the "Katasulf" process was probably promoted by a catalyst; as to how or in what form the necessary amount of oxygen was admitted he regretted he had no information.

Post-War Domestic Fuel Policy, with Particular Reference to South Wales*

By W. R. BRANSON, M.Sc., Assoc.M.Inst.C.E.,
Cardiff

(*Concluded from p. 379*)

Gas undertakings have long established contacts with their consumers, are familiar with the local markets, and have as their main interest the promotion of gas sales in their areas of supply. In the interests of consumers the distribution and sale of gas should remain, therefore, in the hands of gas undertakings, and not in any circumstances pass to those of the owners of coke-oven plants, whose principal interests naturally lie in other directions.†

High-Pressure Gasification

Centralized manufacture would be greatly facilitated by the successful evolution of a high-pressure gasification process which, by avoiding the necessity for compression, would limit the cost of long distance supply to that of the necessary mains. With pressures of the order of 100 lb. or more, these mains could be of quite small diameter.

Although complete gasification in one stage has not yet been developed as an economic process, I should like to draw attention to a possible two-stage process which I believe merits very careful consideration. This would consist of carbonization followed by gasification of the resultant coke in oxygen at moderate pressures in a Lurgi generator. The Lurgi process was developed in Germany before the war, and in the Melchett Lecture to the Institute of Fuel Dr. Grummell(8) urged the erection of a number of these plants in this country as the quickest and in the long run cheapest method of assessing their capabilities. A description of the process was published in the *Journal of the Institute of Fuel*(9) in 1936, and here I need only say that the process requires a non-coking material such as brown coal, anthracite, or coke, and produces a gas of calorific value suitable for town supply at pressures of about 20 atmospheres. The economics of the process will obviously depend to a large extent on the cost of the necessary oxygen, which had been considerably reduced by developments a few years prior to the war.‡

The best place for the experimental installation of a Lurgi generator would seem to be on a gas-works, since it would be possible in the early stages to make use of existing purification and distribution plant, so limiting the capital cost to that of the manufacturing plant only. It is obvious that few gas undertakings are in a position to risk the necessary capital expenditure on a process which might prove less remunerative than normal gasmaking plant. One solution would be for the necessary funds to be advanced, interest free, by the State, possibly through the Fuel Research Board in exchange, for the right of access to audited accounts of the cost of the process and the right to maintain technical staff on the works. The gas undertaking could be given an option to purchase the plant at the end of an agreed period at a price which might be related to the ascertained costs of operation of the process. The co-operation of contracting firms would obviously be necessary in the design and operation of the plant. A first step towards a trial installation might be taken by joint discussions between the Fuel Research Board, the Gas Research Board, and members of the Society of British Gas Industries interested in gas generating plant.

I have devoted some time to urging a trial of the Lurgi process, because I believe that a successful high-pressure complete gasification process would prove of greater benefit to the Gas Industry in South Wales than in any other area for reasons which have already been touched upon—namely, the severely competitive position of coke sales, the relative unsuitability of South Wales coals for gas manufacture, and the comparatively long distances over which gas needs to be transmitted if the advantages of centralized manufacture are to be obtained.

Summing up the latter part of this Paper, it may be said the potentialities for expansion of gas sales in South Wales are highly encouraging, but that the Industry must, if these potentialities are to be realized, put all its energy into the task of so developing its manufacturing and distribution methods that gas costs will be reduced to a level at which the greatest possible number of the population in the area can take advantage of the undoubted cleanliness, convenience, and comfort which gas can offer in the home.

I am very conscious of having covered a big field in a rather inadequate manner, and can only plead that a more complete discussion of some of the possibilities touched upon was impossible for lack of the necessary information, and in any case would have made this Paper inordinately long. It may be felt that I have trespassed beyond the sphere of a "junior," but I feel that the future of our Industry, in which most of us look forward to spending our careers, is to our generation a matter of great concern.

I have endeavoured to confine myself to a discussion of the domestic market, but in addition to the references given at the end of the paper would urge a study by those interested of the 2nd Industrial Survey of South Wales and of the Report of the Departmental Committee on Area Gas Supply. Though it deals with industrial development, the pamphlet by Mr. W. O. Devereux on *Post War Reconstruction of Industry in South Wales* is also worth study by those concerned with planning the future of gas in the area.

* Paper to the Wales and Monmouthshire Junior Gas Association.

† A further source of gas which might become of importance in the area is oil-refining gas. An extension of oil refining in this country such as is advocated by H. Moore ("GAS JOURNAL," Feb. 2, 1944, p. 149, and Feb. 9, 1944, p. 180) would lead to considerable quantities of this gas becoming available.

‡ Continuously operated water gas plants employing a steam-oxygen blast are now in use in this country for the manufacture of water gas for hydrogen production. Experience in the preparation of the necessary supplies of oxygen would be available, therefore, in designing a Lurgi plant.

References

(1) E. W. SMITH.—Presidential Address to Institute of Fuel, "GAS JOURNAL," Oct. 20, 1943, p. 487.
(2) C. A. MASTERMAN.—"The Future of Gas Appliance Design," *Trans. Institution of Gas Engineers*, 1936–7, p. 983.
...(3) HAROLD HARTLEY.—"The Contribution of the Gas Industry in the Domestic Field to National Fuel Economy," Institution of Gas Engineers, Communication No. 248, p. 45.
(4) S. J. BEALE.—"Gas Fuel in Post-War Planning," "GAS JOURNAL," Oct. 13, 1943.
(5) R. LESSING.—"The Rational Preparation of Coal," "GAS JOURNAL," Oct. 6, 1943, and Oct. 13, 1943.
(6) *Second Industrial Survey of South Wales*, University Press Board, Cardiff, 1937.
(7) R. W. HUNTER.—"The Coke Oven Plant at Beckton Gas-Works," Communication No. 68, *Trans. Institution of Gas Engineers*, 1942-3, p. 845.
(8) Dr. E. S. GRUMMELL, C.B.E.—"Conservation of Resources," "GAS JOURNAL," Oct. 27, 1943, p. 517.
(9) H. C. MILLETT.—"The Lurgi Process for Complete Gasification of Coal with Oxygen under Pressure," *Journal of the Institute of Fuel*, No. 49, 10, 15.

DISCUSSION

Major Ivor E. David, Regional Gas Officer, in regard to his alternatives for domestic use, said he did not believe the all-electric house could be ruled out on the grounds indicated by Mr. Branson. In the last 20 years the coal used for electricity had been halved, and it could not be assumed that during the next 10 years there would not be a further reduction. It had not to be forgotten, however, that coal used in the electric industry was completely burned and there were no by-products at all. In regard to the proposal for the use of gas and smokeless fuel, here the Gas Industry could produce both fuels. Reference had been made to the reducing of coal ash to 2%, but that could not be done in South Wales because the inherent ash of South Wales gas coal averaged over 5%. They had to consider what was available to them, and must therefore assume that even with the best washing of coal they could not get results as suggested by Dr. Lessing. Major David suggested that the Industry, particularly the bigger units, could put in washing and blending plants. He described a mixing plant with bunkers of something like 15,000 tons capacity and provision for mixing a large variety of coals. Thus, with washing, it would be possible to get quite near the inherent quantity of ash. He pointed out that anthracites were exceptionally low in ash, but this was a competitive solid fuel. Many of the coals that were being bought were "unwashed" or "through coals," and obviously the remedy for high ash content was as he had indicated. With regard to Table II, he did not accept that American coal fires were three times as efficient as ours. On the question of coke ovens, Major David said there were eleven coke oven installations in South Wales, seven of which were supplying large quantities of gas to gas undertakings. Two were supplying a small portion of their output, and one used all the gas it produced in its own processes. These coke ovens carbonized well over 2 million tons of coal per annum, producing over 20,000 million cu.ft. of gas, of which 4,000 million was available to gas undertakings, who were then purchasing over a third of their coal gas from coke ovens. There was no coke oven gas being used at the moment wastefully. The only case where it was burnt under boilers was when they could not dispose of the gas to the undertakings normally taking it, due to the holders being full. Major David turned his attention to high-pressure gasification, and thought they should be careful about those processes which completely destroyed coal. They hoped to profit by by-products of coal, and considered therefore that existing types of plants were more suitable for their purpose. On the question of the disposal of coke, Major David pointed out that we exported about 3 million tons of coke per annum before the war. In view of the development of industrial installations abroad, he did not think that there would be any difficulty in exporting surplus coke.

Mr. Branson replied that he would agree that there might be a tendency for coal consumption in generation of electricity to fall. At the same time they had to remember that there were losses in distribution which he was inclined to think electricity interests tended to ignore. The answer to Major David's suggestion that coal washeries should be put up at gasworks was, he thought, that until they had centralized manufacture, the economic factor would arise.

Coke export was an obvious means of disposal, but in his own experience the F.O.B. price obtained for coke did not bear very favourable comparison with that for local domestic sales.

The President (Mr. D. W. Rees, Pembroke) was pleased to see from the paper that the manufacturers of firegrates were giving particular attention to their design and efficiency. With regard to the supply of suitable coke for these grates and other industrial purposes, the question was rather more difficult. It would be recalled that in pre-war years supplies of South Wales coal for gas-making purposes was most unsatisfactory; in fact, a number of the best quality gas coals

Braddock's are Best

RETORT-HOUSE GOVERNORS

Braddock's Patent Retort House Governors are unsurpassed for general excellence.

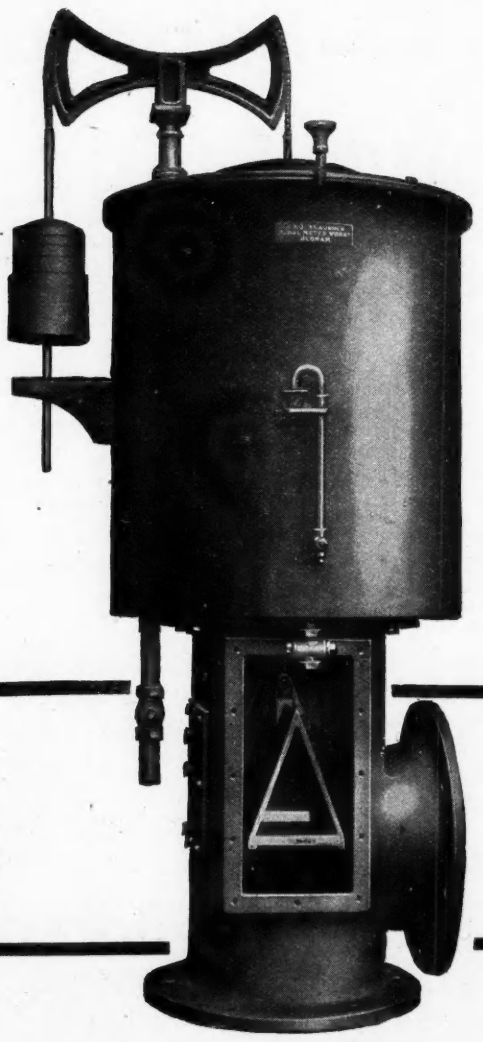
Especially desirable for use with vertical retorts.

Extremely Sensitive.

Detachable side plate enables valve to be easily removed and cleaned without disturbing any other parts.

Hydraulic Distance Control can be fitted if desired.

Particulars and prices upon application.



J. & J. BRADDOCK
(BRANCH OF METERS LTD.)

LONDON - -	Telephone No.:	**Mitcham 2121**
OLDHAM - -	,, ,,	**MAIn 3815/6/7**
WOLVERHAMPTON	,, ,,	**Wolver. 23189**

were not being given to gas undertakings, but were being used in other industries where an inferior type of coal would have served the purpose very well. The position at the present time had improved considerably, and the re-allocation of coal in South Wales had ensured, as far as possible, that the right type of coal was going to the industry that could best utilize it. It was to be hoped that the same conditions would obtain in the post-war years. Mr. Rees feared that in post-war years the price of coal would go up considerably, and unless gas could be produced at a very high efficiency with modern plant, there was little possibility of ever reaching the high consumption of gas for domestic premises shown in the American figures. It must, however, be borne in mind that while an increase in the consumption of gas for domestic premises must be aimed at, the figures shown in the consumption of gas in American homes were higher, in all probability due to the percentage of cheap natural gas available to the American public. In conclusion he pointed out that the question of washing coal at the gas-works, which was the suggestion made by Major David, did not seem a practicable one, as in the case of some coal they would transport from the collieries as much as 30% of inert matter in the coal to the gas undertaking, and apart from the impracticability of coal washing on a small scale, the freight charges for the transportation of inert matter would be considerable.

Mr. **J. F. Rust** (Newport), who proposed a vote of thanks to Mr. Branson, visualized the possibility of keen competition for a time in the post-war period, assuming the electricity people had to unload on the domestic consumer current which they had been using for factories during the war, until such time as the factories got back to their old work. "You do seem to have in your own mind some doubt about the coke market and the question of what to do with some of the small coke you would find available," he said. "Why should we not tackle the electricity people to use this fuel for generation?"

Mr. **B. J. Bell**, seconding, referred to the necessity for the maintenance of consumers' appliances, and how this could be reduced by reduction of sulphur in the gas. In all these considerations they must not lose sight of what had been done in the past. He ventured to say that there was no Industry which had done so much for the conservation of coal during the past 20 years. It was a proved fact that the efficiency of the appliances they had put out had militated against the outputs of gas undertakings.

Oils and Chemicals From Coal*

By Dr. A. PARKER, F.I.C., M.I.Chem.E.,

Director of Fuel Research

I HAVE chosen as my subject one which is destined to be of great importance to this country in the period of reconstruction which will follow this war. The reasons for this are twofold. Firstly, the fact that our reserves of coal, particularly certain special types of coal, are limited, and it will therefore be essential to ensure that all coal raised is used with the maximum possible efficiency. Secondly, the financial state of the country after the war will necessitate restriction of imports, particularly manufactured products, from non-sterling countries and maximum possible utilization of indigenous raw materials.

While it is clear that coal will remain primarily a fuel—that is, a source of heat energy—there is no doubt that it will also be increasingly regarded as a raw material either for conversion to more convenient forms of fuel—gas and oil—or as a source of valuable chemicals.

The two classes of product with which we are concerned, apart from the inorganic chemicals, are closely bound up the one with the other, for, in general, the oil fuels are the source of the chemicals, and it is a question of economics whether the final products for the market shall be the oils or the chemicals derived from them. To take a simple example, benzole can be utilized as a high-octane motor fuel or as a source of benzene and toluene for chemical syntheses. This type of problem confronts our Allies in the United States, where aviation fuel and synthetic rubber compete for the same raw material, the C_4 fraction of petroleum refinery gases.

Naphthalene, probably the most characteristic constituent of high-temperature coal tar, is used direct as a soil fumigant and insecticide, and is the parent of a wide range of dye intermediates, essences, antiseptics, synthetic tannins, &c. It is required in large quantities for the production of phthalic acid and phthalic anhydride (for use in the plastics industry), and further quantities will probably be required for this purpose in the future. The tetra- and decahydro-compounds which have been manufactured for many years in Germany and America under the names tetralin and decalin are now also being produced in this country as solvents. In recent years chlorinated naphthalenes have been developed as fire-proofing agents and for use in preparing synthetic porcelains. Any increased demand for naphthalene could be readily met, for the 1938 production (30,000 tons) represented much less than 50% of the naphthalene content of the tar produced.

In a recent paper before the Institute of Fuel, Mr. Harold Moore criticized the tar industry for employing antiquated methods and equipment, and suggested that it had much to learn from the petroleum refining industry. While I consider that this is to some extent a just criticism and that modern petroleum distillation equipment and certain of the new catalytic treatment processes might be applied with advantage to coal tar refining, I believe that the more advanced tar distillers could readily extract and prepare in pure form many of the constituents, not normally extracted, if large-scale uses could easily be found for them. Thus, side by side with the development of methods for resolving tar into its constituents, there is need for much further research into their utilization. For many years now, the treatment of tars and oils has formed an important branch of the work at the Fuel Research Station and at the Department's Chemical Research Laboratory. The broad aim of this work is the development of new applications for coal tars and their constituents. Up to the present, most of the work on this subject at the Fuel Research Station has been directed towards the production of motor fuel and other products from tars and their distillates by hydrogenation.

The gaseous products of high-temperature carbonization have not up to the present been seriously regarded as a source of chemicals, though there have been suggestions from time to time for the manufacture of alcohols from the olefine constituents. Gas from low-temperature carbonization contains a larger quantity of olefines which might well be utilized for chemical syntheses by methods similar to those used for petroleum refinery gases.

Methane, which can be extracted from coke-oven gas by liquefaction, can be stored in liquid form and used as a fuel for the internal combustion engine, or developed as a raw material for chemical industry. In America, methane in the form of natural gas is being increasingly used in this way, and it has been stated recently that one-third of her requirements of formaldehyde and methyl alcohol are now obtained by the controlled oxidation of natural gas.

In the early days of the Gas Industry the ammoniacal liquor was regarded as a nuisance to be got rid of as discreetly as possible, but by 1873, gas liquor was being utilized as the main source of ammonia and its salts. Since then the manufacture of by-product ammonium sulphate has continued, but competition from the synthetic product caused the price to fall from £12 10s. per ton in 1926 to less than half this amount in 1932 and recovery became uneconomic at many works. An international agreement put an end to intense competition between producers, and the price steadily rose to over £7 in 1938 and recovery from gas liquor again became economic. In 1938 the total production of by-product ammonia was 350,000 tons (calculated as ammonium sulphate), representing over 50% of the total made in this country. Although, when synthetic ammonium sulphate first appeared on the market, the coal product appeared at a disadvantage in colour and physical properties, improvements in manufacture now make it possible to market by-product sulphate of excellent chemical and physical quality.

The sulphur in crude coal gas affords another example of a liability becoming an asset. During 1938, 220,000 tons of sulphuric acid, 27% of the total production, were produced from the sulphur in the spent oxide from gas purification. In the past a considerable proportion of coke-oven gas has been burnt without any purification, leading not only to the loss of a valuable commodity, but causing atmospheric pollution. It is clear, however, that the coking industry now realizes the importance of sulphur removal, and that the installation of purification equipment is often a sound investment. The Gas Industry is also contemplating further purification of town gas, and hopes to be able to reduce the organic sulphur (at present 30–40 gr./100 cu.ft.) at least to 10 gr. and ultimately to 3 gr./100 cu.ft. This is all to the good. A more complete removal of sulphur from carbonization gases would assist in reducing the imports of sulphur and pyrites, while reducing atmospheric pollution and the deterioration of gas-burning appliances.

The term "by-products" as applied to the oils and chemicals obtained in coal carbonization hardly does them justice. Although the chemical products represent only 7% of the thermal energy of the coal, their monetary value is 16% of the total products.

In view of our limited coal resources, it may be that the burning of raw coal (other than steam coals and anthracite) will later have to be restricted, with an expansion of the coal carbonizing industries to supply free-burning coke. The necessity for conserving coking coals in particular makes it important to devote special attention to processes for carbonizing non-caking coals, possibly in admixture with coking coals. Such expansion would concomitantly lead to a useful increase in home production of oils and chemicals. From this point of view, also, the carbonization of cannel coals which give yields of oil as high as 40 gallons per ton should be carefully considered, though the quantity of such coal available is not great.

* From a Paper to be presented to the North Staffordshire Fuel Society.

LARGE-SCALE APPARATUS FOR THE COOKING AND SERVING OF FOOD

A view of the Servery Side of a Women's Canteen

The complete Kitchen Installation planned and equipped by

R. & A. MAIN LIMITED MAIN LONDON AND FALKIRK

Hydrogenation

The liquefaction of coal through the agency of hydrogen at high temperatures and pressures was discovered by Bergius and developed by him over the period 1910–1927. After the last war the I.G. Syndicate started work independently, and by 1927 German development of coal hydrogenation had passed entirely into their hands. Some idea of the extent of German development of this process is given by the estimated annual output of 850 million gallons of hydrogenation spirit in 1940. It is probable that since then modifications made to the plants by the R.A.F. have led to some reduction in output.

The importance of coal hydrogenation was early recognized in this country, and experimental work was started at the Fuel Research Station in 1923. In 1924 the British Bergius Syndicate was formed, and an option on the patent rights in the Bergius process obtained for the British Empire. As a result of tests carried out on British coals in Germany, it was decided to expand the work at the Fuel Research Station. A pilot plant was erected there in 1926, and experimental work in this and smaller-scale plants was carried on until a year or two before the present war. In the years 1930–1939 attention was also paid to the hydrogenation of tars and tar distillates, particularly those produced by low-temperature carbonization, and successful experiments on a scale of 200–400 gallons of tar per day at pressures up to 400 atmospheres were carried out towards the end of this period. An important branch of the work on hydrogenation at the Fuel Research Station has been the study of the chemistry of the process, which has resulted in a material increase in our knowledge of the reactions involved.

(*To be continued*)

Radiation Ltd.

The Annual Meeting of Radiation Ltd. was held at Incorporated Accountants' Hall, W.C. 2, on March 30, the Chairman (Mr. J. F. Davies) presiding.

Mr. Davies said: In the Radiation Profit and Loss Account the gross income for the year from Subsidiary Companies is £300,478, compared with the corresponding figure of £290,078 for the previous year. After deducting Income Tax but including Transfer Fees and Bank Interest, the Net Income for the year is £151,110. This sum, together with the balance of £150,499 brought forward from the previous year, make a total amount of £301,609 to the credit of Profit and Loss Account, and after providing for the interim dividend on the Preference Stock, there is an available balance of £285,296 as appears in the Radiation Balance Sheet.

It is proposed to pay the half-yearly dividend on the Preference Stock and a dividend of 10%, less Income Tax, on the Ordinary Stock for the year, together absorbing £129,441. If you approve the Report now before you, and agree the dividends proposed, the balance to carry forward to the next Account will be £155,855, which is an increase of £5,356 compared with the amount last year.

A year ago in presenting the Accounts for 1942, we recommended the appropriation of £20,000 to General Reserve, raising that item in the Radiation Balance Sheet to £260,000. This year we have transferred to General Reserve the figure of £25,000 formerly appropriated to War Damage, as the latter risk is covered by insurance, the premiums on which are charged to Revenue. General Reserve therefore stands in the Balance Sheet at £285,000.

On the Assets side of the Radiation Balance Sheet the main item is £3,825,999, representing the cost of our interest in the Subsidiary Companies.

It has been possible this year to include with the Directors' Report and Accounts the Statement of Combined Assets and Liabilities of the Subsidiary Companies. Last year you will remember this Statement was not included because the Subsidiary Companies at that time were unable to complete their Accounts for the year 1942.

The Statement of Combined Assets and Liabilities shows the December, 1942 figures in addition to those at December, 1943, and you will notice on the Assets side that Buildings and Plant total £1,039,267, a decrease of £32,938 compared with the book value of the previous year. The decrease represents the depreciation written off, less additions, during the year.

Stocks and Debtors total £1,798,402 and show a decrease on last year's figures of £64,781, while the items Investments and Cash, together have increased by £487,697 over the previous year's amounts.

On the Liabilities side of the Combined Statement, the first item, Sundry Creditors, shows an increase of £168,317; this is largely due to liability for taxation. Following the practice adopted for many years past the Subsidiary Companies reserved in their Accounts at December last, the amount of Income Tax payable on the profits of the year covered by the Accounts. I would mention that the Contingency Reserve formerly included in this item has been transferred to Pensions Reserve to raise that fund to the requisite level.

The next item is the £750,000 Reserve for Post-War, mentioned in the Directors' Report as having been set aside out of the amounts carried forward on Profit and Loss Accounts of the Subsidiary Companies, for the purpose of meeting expenditure, anticipated in the post-war period, on development and re-equipment of the undertaking of the Company.

I referred in my remarks last year to the expenditure which we will be called upon to meet in the post-war period; we have maintained a constant review of that subject, and are more than ever convinced that now is the appropriate time to make due provision for this purpose. When the period of the present emergency has passed we will, where necessary, re-equip our factories and plants and be prepared to extend and develop our former activities, in order that our undertaking may continue to uphold its progressive character and occupy the important position it holds in the Industry. We must ensure that there is work for our people with adequate welfare services, when they are released from the Forces.

We now come to the item of the cost to Radiation Ltd. of Investments in Subsidiary Companies, £2,392,675, and the amount due to Radiation Ltd. from the Subsidiary Companies, £1,433,324. These two items correspond to the first two amounts on the Assets side of the Radiation Balance Sheet.

The final item on the Combined Statement is the balance to credit of Profit and Loss Accounts of the Subsidiary Companies, which after providing for Taxation and Dividends to Radiation Ltd., is £918,221, as compared with the balance of £744,271 a year ago and the balance of £571,367 at December, 1941. Deducting the £750,000 which has been transferred to Reserve for Post-War, there remains a balance of £168,221 to be carried forward to 1944.

The British Gas Industry not only ranks as one of the great essential industries of this country, but its achievements during the present century show that it is one of the most progressive. On the manufacturing and supply side of the Industry the record of its achievements during the present emergency has yet to be published, but we all know that in spite of handicaps—which have been many and varied—factory and household alike have enjoyed continuous service. The Gas Industry is essentially a technical Industry, and on the appliance side much of the progress made hitherto has been due to the efforts, largely competitive, of individual appliance manufacturers—among whom we take our place. For the future I hope to see more co-operative working in the field of research. The system of co-operative research in British Industry was instituted during the War of 1914–18, when the Government, with the object of encouraging research work, established the Department of Scientific and Industrial Research and provided funds to defray part of the cost incurred.

There are at present 25 Research Associations participating in this scheme, including among them the Gas Research Board, in which the Gas Industry is particularly interested. It has been suggested that every firm in industry should contribute its quota, either by itself undertaking research work or by subscribing an equivalent sum for the prosecution of research, or by both means.

Radiation Ltd. maintains, and will continue to maintain, active Research Laboratories. We believe also in the need for co-operative work. Accordingly we subscribe to Research Associations concerned both with our products and with the materials used in their manufacture. We also make our contribution, by way of grant or provision of fellowship, towards independent work in the research departments of Universities and Colleges.

A commercial organization should undertake or support fundamental research not only as part of its duty to the community as a whole and to its own branch of industry in particular, but also in its own interests. Touching briefly on only one aspect, we have derived considerable benefit from being able to draw on our Laboratory staff from time to time for officials and executives in other branches of our activities. The more men we have in our service with at least a modicum of sound technical training the higher will be the standard of our products, and it is our policy to encourage such men to enter all sides of our activities.

It is now 25 years since Radiation Ltd. was formed. I do not propose to attempt here any detailed record of our research work, and will content myself with saying we are glad to think that its results have been of benefit not only to ourselves, but also to the Gas Industry.

I have stressed somewhat this subject of research work because I am convinced we must continue, in increasing measure, our own activities in that field, and where appropriate our support of others similarly engaged.

The great effort which the Country must make after the war to provide homes for the people will entail the provision of efficient cooking and heating apparatus of all kinds in large volume, in the shortest possible time and at the lowest possible cost. At the risk perhaps of seeming to have undue regard to our own interests, I stress the importance of efficiency. While no reputable manufacturer would expect or desire to make undue profit out of a national emergency, our wide experience in such matters convinces me that it will not be in the national interest to economize on first cost at the expense of efficiency in use.

I wish once again to pay tribute to the members of our staffs and to our workpeople, all of whom have borne the strain of another year under war conditions with cheerfulness and determination. I have great admiration for the steady way in which they have carried on.

We have always in mind our employees who are in the various Forces and Services, at home or abroad, and on their return we will welcome them again to our service.

For every size of works and every class of coal...

WEST'S

CARBONIZING PLANTS

GLOVER-WEST VERTICALS

WESTVERTICAL CHAMBERS

440 carbonizing plants have been built or are under construction by West's in 24 countries. Working results from a wide variety of gas coals have established the high efficiency and adaptability of the West systems.

WEST'S

GAS IMPROVEMENT CO · LTD ·

MILES PLATTING MANCHESTER 10

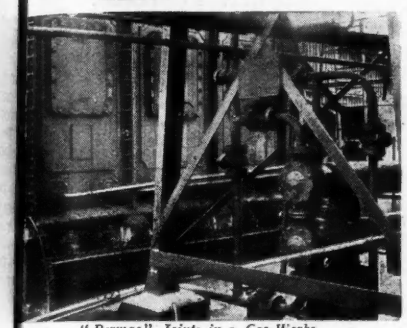
TELEPHONE—COLLYHURST 2961-2-3-4-5 TELEGRAMS—STOKER MANCHESTER

LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, W.C.2 TELEPHONE: HOLBORN 4108-9 TELEGRAMS: WESGASCO ESTRAND

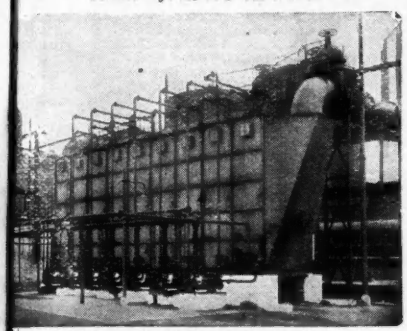
There's only one

Permac!

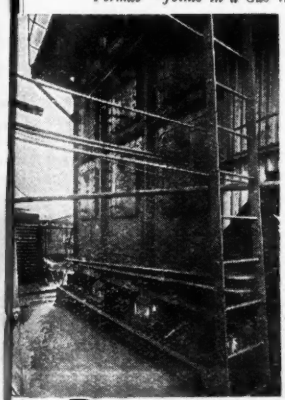
METAL-TO-METAL JOINTING MATERIAL.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Be sure you get it!

Here is a selection of "Permac" joints photographed in various Gas Works. "Permac," the Metal-to-Metal Jointing has been holding up difficult joints like these for over 25 years. Send for particulars.

Sole Manufacturers:

THOMAS & BISHOP LTD

(formerly of 37, Tabernacle Street, London, E.C. 2)

Temporary address:

39, Arthur Road, Wimbledon Park, London, S.W. 19

PRODUCTS PRICES

The London Market April 3.

A new Government Order came into effect on March 1 controlling the price of Benzole and Coal Spirit and replacing the Control of Coal Tar Naphtha and Xylole Order, 1943.

The new Order is known as the Control of Benzole and Coal Spirit Order, 1944 (S.R. & O. 1944, No. 172).

By this new Order the price of Motor Benzole is fixed at 2s. per gallon. The new Order also lays down the method of evaluating Crude Benzole.

The Order also calls for periodical returns to the Ministry of Fuel and Power from all producers of Crude and Refined Benzole.

The only item of interest to report in connection with the Coal Tar products market is the issue of Government Order designated the Control of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), which contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Prices of Coal Tar products are unchanged.

The Provinces April 3.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 11d. to 2s. 1d., pure, 2s. 7½d. (controlled by the Control of Toluene No. 3 Order, dated July 14, 1943, operative from July 20, 1943). Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1944, dated Feb. 18, 1944, S. R. & O. 1944, No. 172, operative from March 1. Carbolic acid, 60's, naphthalene, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland April 1.

Conditions are unchanged with throughput well maintained. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7¼d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha:† 6½d. to 7d. per gallon. Solvent naphtha:* Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 2d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

TRADE CARDS

FULL particulars of these spaces can be obtained on application to the Publishers. They are designed principally for the use of the firms whose display advertisements cannot be included owing to paper rationing.

VEE-REG VALVES

FOR BETTER VALVE SERVICE AT LESS COST!

ENGINEERING SPECIALISTS LTD.

114 THE AVENUE, BRONDESBURY PARK, LONDON, N.W. 6.

NATIONAL ENAMELS LTD.

53, Norman Road, Greenwich, London, S.E.10. **T/N** Greenwich 2266–7.

Our COOKER LININGS, CROWN TRAYS and SPLASHBACKS have been well proved by the Gas Industry.

MILNE'S METERS LTD.

Milton House Works, Edinburgh, and Victoria Road, Leeds.

METERS, PRESSURE GAUGES.

A. G. SUTHERLAND LTD.

Warwick Road, Greet, Birmingham. **T/N** Victoria 2184-5. **T/A** Metriform, Birmingham. London: Riverside Road, S.W. 17. **T/N** Wimbledon 5454. **T/A** Insituslot, Toot, London, and at Salford and Nottingham.

GAS METERS

WM. PRESS & SON.

38, Old Queen Street, London, S.W. 1. **T/N** Whitehall 1752, 2961. **T/A** Unwater, Parl.

CIVIL ENGINEERING CONTRACTORS

Depot phones for Emergency Work (Day and Night): TOTtenham 2665-6; ADVance 3771; LIBerty 3229.

Arkon

INSTRUMENTS

Gas Flow Recorders and Indicators
Pressure and Vacuum Recorders and Indicators
Full Scale or Inclined Gauges

WALKER, CROSWELLER & CO. LTD.
CHELTENHAM, GLOS. Cheltenham 5172

WESTWOOD & WRIGHTS LTD.

Round Oak, Brierley Hill, Staffs. **T/N** 7101–2. **T/A** Westwood Wrights, Brierley Hill.

GAS & CONSTRUCTIONAL ENGINEERS

M. B. WILD & CO. LTD.

Mechanical Engineers, Argyle Street, Birmingham 7. **T/N** East 0472.

CAPSTANS. BY-PRODUCTS COKE OVEN MACHINERY. ELEVATORS. CONVEYORS. WAGON TIPPLERS.

CHARLES WINN & CO., LTD.

Granville Street, Birmingham, 1. **T/N** Midland 3695 (4 lines). **T/A** Winn, Birmingham.

BACK PRESSURE GAS VALVES, SIZES 1 in. to 12 in. FOR USE WITH AIR BLAST IN INDUSTRIAL AND OTHER GAS-HEATED APPARATUS.